

AMENDMENT TO THE SPECIFICATION

Please replace lines 8–17 on page 1 with the following amended text:

BACKGROUND OF THE INVENTION

Current methods for manufacturing diamond films by microwave-plasma-assisted chemical vapour-vapor deposition (MP-CVD) are of limited effectiveness, since the large amounts of energy, which are needed to obtain diamond of electronic quality at reasonable growth rates (about 2 µm/h), lead to heating of the walls, on which This process causes hydrogen atoms contained in the plasma, that which activate the reaction, to recombine and therefore cannot not participate in the reaction. It is therefore necessary to install a constricting device for cooling the walls.

Please insert the following text on page 1, line 35:

BRIEF SUMMARY OF THE INVENTION

Please replace lines 11–17 on page 2 with the following amended text:

For this purpose, the invention provides a process for manufacturing a diamond film assisted by a pulsed microwave plasma, which, apart from the above mentioned abovementioned features, is characterized in that power is injected into the volume of the plasma with a peak power density of at least 100 W/cm³ while maintaining the substrate to a substrate temperature of between 700 °C and 1000 °C.

Please insert the following text on page 4, line 15:

BRIEF DESCRIPTION OF THE DRAWINGS

Please insert the following text on page 4, line 25:

DETAILED DESCRIPTION OF THE INVENTION

Please replace lines 26–38 on page 4 with the following amended text:

Figure 1 shows an example of how to implement the method according to the invention using a vacuum chamber 1 containing a support 2 placed on its base 3. This vacuum chamber is placed in a Faraday cage 13 acting as a cavity or the vacuum chamber itself acts as a cavity. Also, in the vacuum chamber is a single injection nozzle 4, or a plurality of injection nozzles. The injection nozzle, for emitting emits, into the vacuum chamber, gases comprising, : on the one hand, a source of molecular hydrogen, such as dihydrogen (H_2); and, on the other hand, b) a source of carbon, such as for example a hydrocarbon like methane (CH_4), carbon dioxide (CO_2) or like.

Please replace lines 33–39 on page 7 and lines 1–4 on page 8 with the following amended text:

These conditions greatly favourfavor the disruption of the molecular hydrogen H_2 emitted by the injection nozzle 4 and the formation of carbon-containing radicals. A concentration between $1.7 \times 10^{16} \text{ cm}^{-3}$ and $5 \times 10^{17} \text{ cm}^{-3}$ of atomic hydrogen in the plasma of between $1.7 \times 10^{16} \text{ cm}^{-3}$ and $5 \times 10^{17} \text{ cm}^{-3}$ may be measured. Such an atomic hydrogen concentrations makes it possible to increase the reaction rate for depositing the carbon-containing radicals contained in the plasma in the form of a diamond to a high reaction rate, while guaranteeing the electronic quality of the diamond film produced. These conditions thus advantageously allow the concentration of carbon-containing radicals in the plasma to be increased so that the latter may contain between $2 \times 10^{14} \text{ cm}^{-3}$ and $1 \times 10^{15} \text{ cm}^{-3}$ CH_3 radicals. Since the incorporation of carbon atoms into the diamond film 8 being formed is substantial, the molecular methane may be emitted by the injection nozzle 4 with a molar ratio with respect to molecular hydrogen H_2 of possibly up to 12% (with respect to molecular hydrogen, H_2).

Please replace lines 35–39 on page 9 and lines 1–16 on page 10 with the following amended text:

The lifetime T_V of the atomic hydrogen H in the plasma 7 may be determined, for example, by a known plasma induced fluorescence (PIF) technique. As shown in Figure 2b, PIF technique consisting consists of generating, as shown in Figure 2b, in addition to the first power peak of that has the duration T_{on} , with and at the peak power P_c , and the second a second power peak, after the first, that occurs at a defined time T_0 taken between T_{on} and T . The second peak is and of short duration, for example about 1/10 of T_{on} . The second peak, which, by direct collision with an electron, excites the hydrogen atoms H still present in the plasma 7 at time T_0 , this This excitation is being measured and compared with the excitation caused by the first peak of the discharge, thereby making it possible to determine the concentration of hydrogen atoms H remaining in the plasma 7 at time T_0 . Determining the concentration of hydrogen atoms remaining in the plasma thus allows to determine and therefore the hydrogen atom lifetime under the given conditions of the plasma. Optionally, this information may be transmitted to the microwave generator 6 which adapts the parameters of the discharge accordingly. Other known techniques, such as laser-induced stimulated emission (LISE) or two photon laser-induced fluorescence may be used in this context.